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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/541,825	03/28/2006	Xiaoqiang Xu	274330US6PCT	8732
22850 7590 05/23/2011 OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, L.L.P. 1940 DUKE STREET ALEXANDRIA, VA 22314				
EXAMINER DEHOHAN, QUEENIE S				
ART UNIT		PAPER NUMBER		
1741				
NOTIFICATION DATE		DELIVERY MODE		
05/23/2011		ELECTRONIC		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary

Application No.

10/541,825

Applicant(s)

XU ET AL.

Examiner

QUEENIE DEHGHAN

Art Unit

1741

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 December 2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 14, 16-18 and 21-28 is/are pending in the application.
- 4a) Of the above claim(s) 22-24 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 14, 16-18, 21 and 25-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-946)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on December 10, 2010 has been entered.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wakiyama (JP abstract 53-092311) in view of Suh (4,270,951). Wakiyama discloses a heat exchanger device comprising at least one fin (2) including means for blowing a fluid, wherein the at least wall of the fin is formed by sintering powdered metal (drawing 2). As can be seen in drawing 2, the blowing means (1) does include at least one wall of the fin (2). According to an oral translation of the reference, a fluid is directed in the tube (1), which is the means for blowing a fluid. Also, the fins and tube is made by filling a mold comprising a male die (12) and female die (13) with metal powder (19) and sintering to form the structure (according to the oral translation). Since the structure is

made of the same metal powdered along its length and all around, then the blowing means is uniform all around. However, Wakiyama does not disclose specifics regarding the powdered metal. Suh teaches making parts comprising of sintering powder metal, wherein the powder can comprise of various metal powders including nickel, brass, and stainless steel, with an average particle size smaller than 100 μ m (abstract, col. 1 lines 5-16, col. 3 lines 29-46). Suh also suggest the density of the porous parts is about 85% or about 88%, which indicates a porosity of about 15% or about 12%. It would have been obvious to one of ordinary skill in the art at the time of the invention to have utilized a combination of known sinterable metal powder such as nickel, brass and stainless steel with the proper particle size, as suggested by Suh, in the heat exchanger of Wakiyama, so as achieve the desired porosity of the tube and fins for the desired cooling effect.

3. Claims 14, 18, 21, 25-26, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Russell (3,345,147) in view of Valyi (3,452,783) and Suh (4,270,951). Regarding claims 14 and 21, Russell discloses a heat exchanger device comprising at least one fin including means for blowing a fluid, wherein the blowing means are uniform and include at least one wall of the fin, the at least one wall having open porosity (figures 4 and 5, col. 5, lines 23-29, col. 3 lines 44-49, col. 6 lines 24-30). Russell also teaches an example wherein the fin is made of a metal mesh with a porosity of the wall is 30% (col. 6 lines 14-15). Russell further teaches other porous materials can be used for the fin, just as long as the porosity has the desire permeability to retain a cooling liquid from freely flowing through while yet still allowing for volatized gases to pass (col.

7 lines 57-64). Naturally, varying the material of the fins would also vary the porosity of the fin. Valyi teaches a porous structure comprising sintered powder metal that is useful as a heat exchanger (col. 1 lines 15-20, col. 3 lines 41-52), such as evaporative coolers in which liquid is evaporated for the purposes of transpiration cooling (col. 1 lines 51-55). Valyi teaches the choice of particle size of the metal powder will determine the amount of porosity of the structure. It would have been obvious to one of ordinary skill in the art at the time of the invention to have employed sintered powder metal as an alternative porous structure the apparatus of Russell as a known equivalent to the porous material of Russell for achieving the predictable result of controlling the evaporation of the cooling fluid and hence the cooling effect of the fins.

4. However, Valyi does not disclose the specific metal powder used. Suh similar teaches manufacturing of porous structures by sintering of powder metal, wherein the powder can comprise of various metal powders including nickel, brass, and stainless steel (abstract, col. 1 lines 5-16, col. 3 lines 29-46). Suh teaches metal powder has a particle size smaller than 100 μ m. In fact, more than 75% of the particle size distribution suggested by Suh has a particle size of less than 80 μ m (col. 3 lines 41-46). It would have been obvious to one of ordinary skill in the art at the time of the invention to have utilized a combination of known sinterable metal powder such as nickel, brass and stainless steel with the proper particle size, as suggested by Suh, in the heat exchanger of Russell, so as achieve the desired porosity of the fins for the desired cooling effect.

5. Additionally, Suh also suggest the density of the porous parts is about 85% or about 88%, which indicates a porosity of about 15% or about 12%. As suggested by

Valyi, the final porosity of the porous metal structure would be determined by the particle size. According, it would have been obvious to one of ordinary skill in the art at the time of the invention to have employed metal powder with a determined particle size as it is a known result-effective variable for achieving the desired porosity (i.e. 17%) of the sintered body in the apparatus of Russell.

6. Regarding claim 18, a blowing fluid velocity field is symmetric across the at least one open porosity wall (figure 5, col. 7 lines 31-34).
7. Regarding claim 25, the blowing fluid results from vaporization within the fin of a fluid that was initially in a liquid state (col. 7 lines 20-30).
8. Regarding claim 26, the apparatus further comprises an auxiliary cooling circuit wherein the manifold is also cooled in addition to the fins (col. 4 lines 50-55).
9. Claims 16-17 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Russell (3,345,147) in view of Valyi (3,452,783) and Suh (4,270,951), as applied to claim 14 above. Russell discloses the fin is of parallelepipedal overall shape and tubular cross section (figure 6). Russell also teaches that permeability is a result effective variable of the material selected for achieving the desired resistance against the free flow of the cooling fluid and hence the desired cooling effect (col. 7 lines 49-72). Valyi also teaches the final porosity of the porous metal structure would be determined by the particle size, as mentioned above. It would have been obvious to one of ordinary skill in the art at the time of the invention to have optimized the permeability of the cooling fin (such as to a value in the range from 500 to 600 Sm³/h/m²) as it is a known result effective variable for achieving the desired cooling effect of the cooling fins.

Response to Arguments

10. Applicant's arguments with respect to claim 14 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to QUEENIE DEGHAN whose telephone number is (571)272-8209. The examiner can normally be reached on Monday through Friday 9:00am - 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Daniels can be reached on 571-272-2450. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Queenie Dehghan/
Primary Examiner, Art Unit 1741